

MOS FIELD EFFECT TRANSISTOR

2SK3115

SWITCHING

N-CHANNEL POWER MOS FET

INDUSTRIAL USE

DESCRIPTION

The 2SK3115 is N-Channel DMOS FET device that features a low gate charge and excellent switching characteristics, and designed for high voltage applications such as switching power supply, AC adapter.

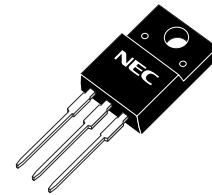
FEATURES

- Low gate charge
 $Q_G = 26 \text{ nC TYP. (} V_{DD} = 450 \text{ V, } V_{GS} = 10 \text{ V, } I_D = 6.0 \text{ A)}$
- Gate voltage rating $\pm 30 \text{ V}$
- Low on-state resistance
 $R_{DS(on)} = 1.2 \Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 3.0 \text{ A)}$
- Avalanche capability ratings

ORDERING INFORMATION

| PART NUMBER | PACKAGE |
|-------------|-----------------|
| 2SK3115 | Isolated TO-220 |

★ (Isolated TO-220)



ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)

| | | | |
|--|----------------|------------------------|------------------|
| Drain to Source Voltage ($V_{GS} = 0 \text{ V}$) | V_{DSS} | 600 | V |
| Gate to Source Voltage ($V_{DS} = 0 \text{ V}$) | V_{GSS} | ± 30 | V |
| Drain Current (DC) ($T_C = 25^\circ\text{C}$) | $I_{D(DC)}$ | ± 6.0 | A |
| Drain Current (pulse) ^{Note1} | $I_{D(pulse)}$ | ± 24 | A |
| Total Power Dissipation ($T_A = 25^\circ\text{C}$) | P_{T1} | 2.0 | W |
| Total Power Dissipation ($T_C = 25^\circ\text{C}$) | P_{T2} | 35 | W |
| Channel Temperature | T_{ch} | 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | $-55 \text{ to } +150$ | $^\circ\text{C}$ |
| Single Avalanche Current ^{Note2} | I_{AS} | 6.0 | A |
| Single Avalanche Energy ^{Note2} | E_{AS} | 24 | mJ |

Notes 1. $PW \leq 10 \mu\text{s}$, Duty Cycle $\leq 1\%$

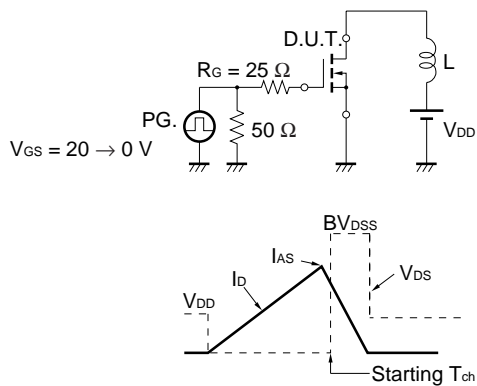
2. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = 150 \text{ V}$, $R_G = 25 \Omega$, $V_{GS} = 20 \rightarrow 0 \text{ V}$

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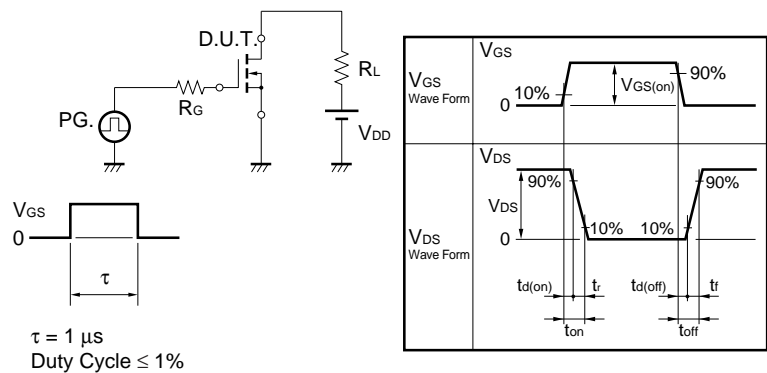
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

| Characteristics | Symbol | Test Conditions | MIN. | TYP. | MAX. | Unit |
|-------------------------------------|----------------------|---|------|------|------|------|
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = 600 V, V _{GS} = 0 V | | | 100 | μA |
| Gate Leakage Current | I _{GSS} | V _{GS} = ±30 V, V _{DS} = 0 V | | | ±100 | nA |
| Gate Cut-off Voltage | V _{GS(off)} | V _{DS} = 10 V, I _D = 1 mA | 2.5 | | 3.5 | V |
| Forward Transfer Admittance | y _{fs} | V _{DS} = 10 V, I _D = 3.0 A | 2.0 | | | S |
| Drain to Source On-state Resistance | R _{DS(on)} | V _{GS} = 10 V, I _D = 3.0 A | | 0.9 | 1.2 | Ω |
| Input Capacitance | C _{iss} | V _{DS} = 10 V | | 1100 | | pF |
| Output Capacitance | C _{oss} | V _{GS} = 0 V | | 200 | | pF |
| Reverse Transfer Capacitance | C _{rss} | f = 1 MHz | | 20 | | pF |
| Turn-on Delay Time | t _{d(on)} | V _{DD} = 150 V, I _D = 3.0 A | | 18 | | ns |
| Rise Time | t _r | V _{GS(on)} = 10 V | | 12 | | ns |
| Turn-off Delay Time | t _{d(off)} | R _G = 10 Ω, R _L = 50 Ω | | 50 | | ns |
| Fall Time | t _f | | | 15 | | ns |
| Total Gate Charge | Q _G | V _{DD} = 450 V | | 26 | | nC |
| Gate to Source Charge | Q _{GS} | V _{GS} = 10 V | | 6 | | nC |
| Gate to Drain Charge | Q _{GD} | I _D = 6.0 A | | 10 | | nC |
| Body Diode Forward Voltage | V _{F(S-D)} | I _F = 6.0 A, V _{GS} = 0 V | | 1.0 | | V |
| Reverse Recovery Time | t _{rr} | I _F = 6.0 A, V _{GS} = 0 V | | 1.4 | | μs |
| Reverse Recovery Charge | Q _{rr} | di/dt = 50 A/μs | | 6.5 | | μC |

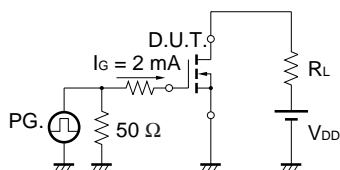
★ TEST CIRCUIT 1 AVALANCHE CAPABILITY



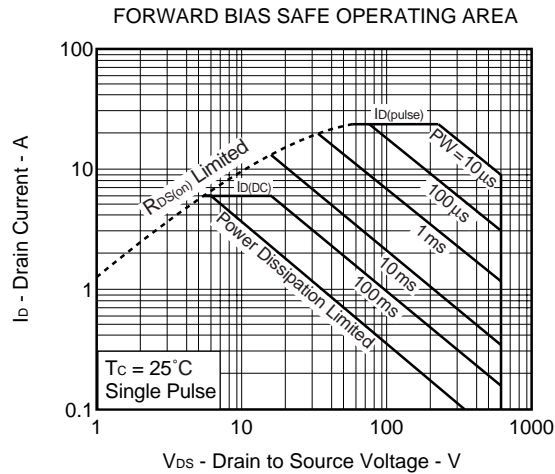
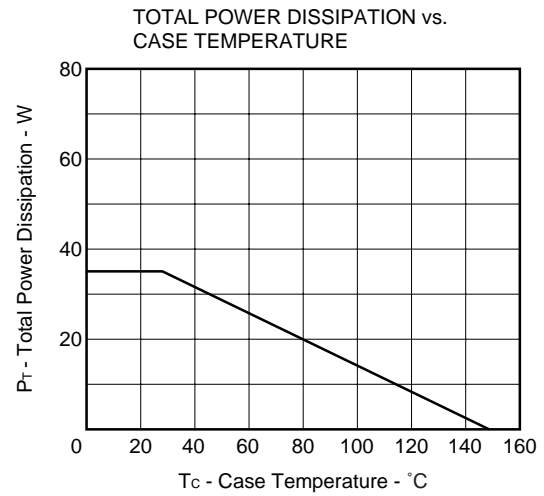
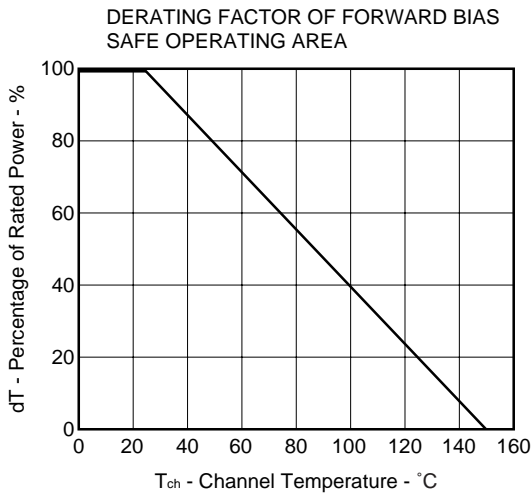
TEST CIRCUIT 2 SWITCHING TIME



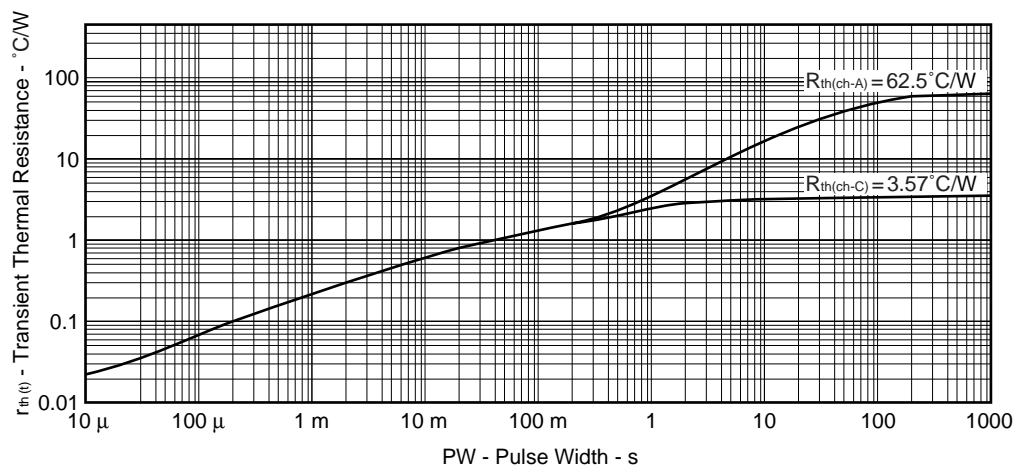
TEST CIRCUIT 3 GATE CHARGE



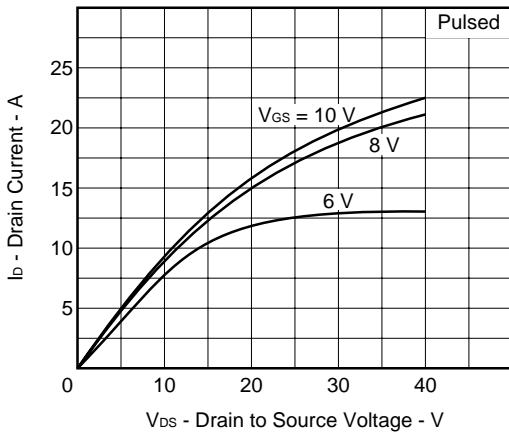
★ TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)



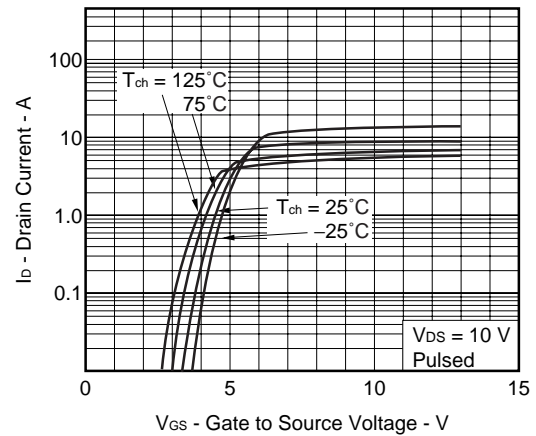
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



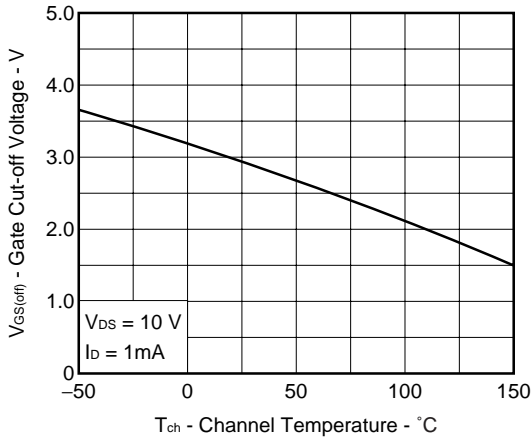
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



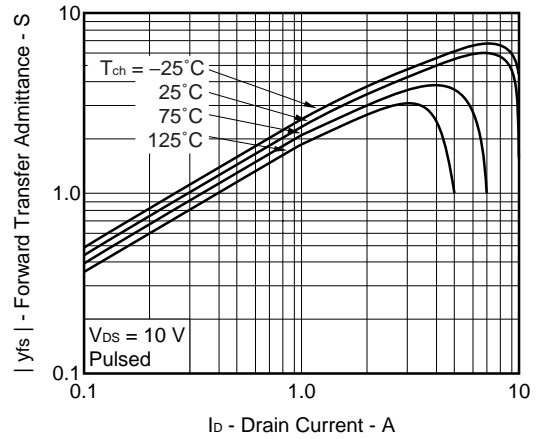
FORWARD TRANSFER CHARACTERISTICS



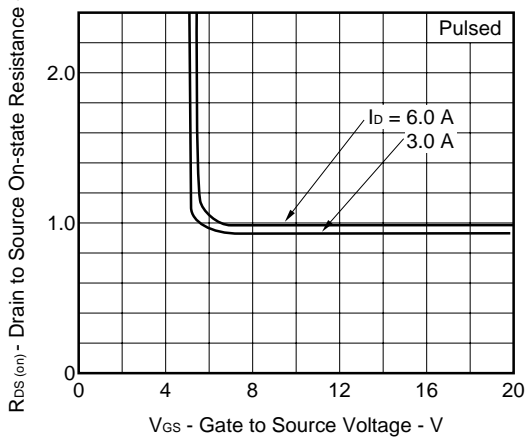
GATE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



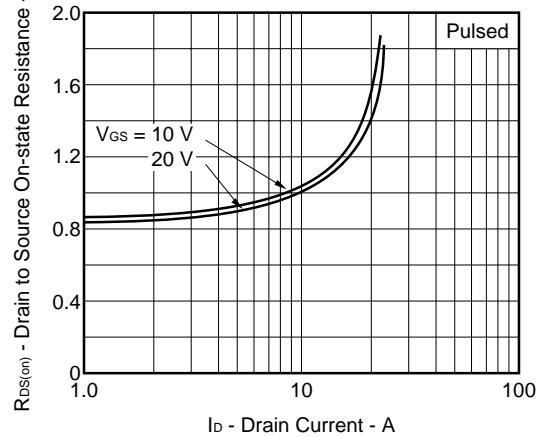
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT

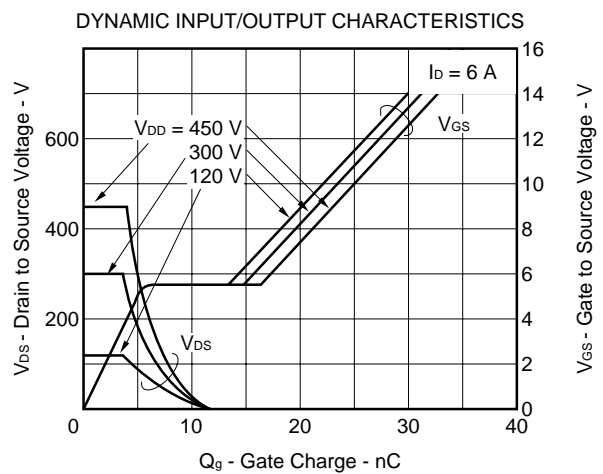
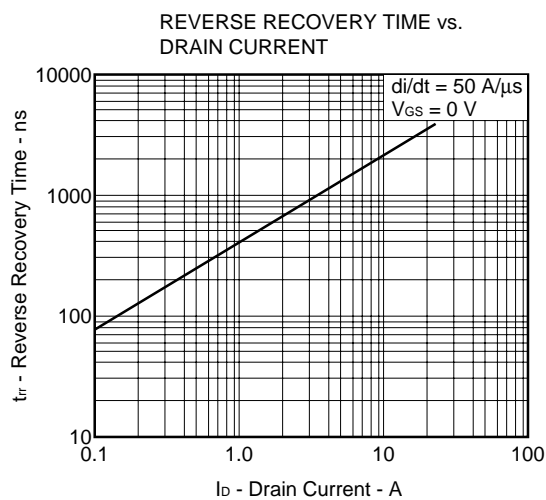
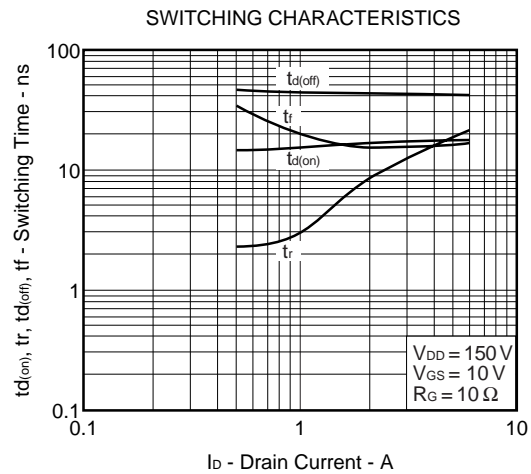
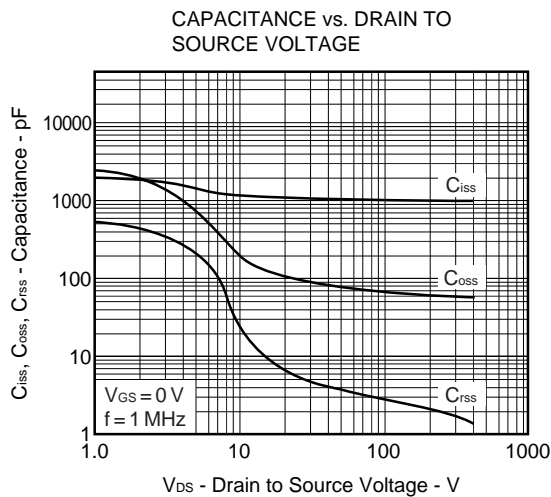
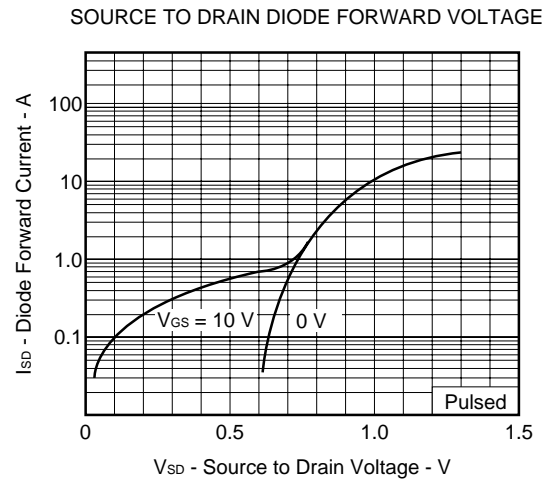
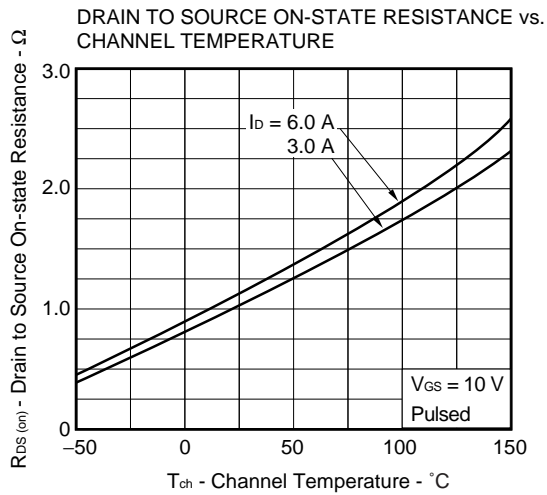


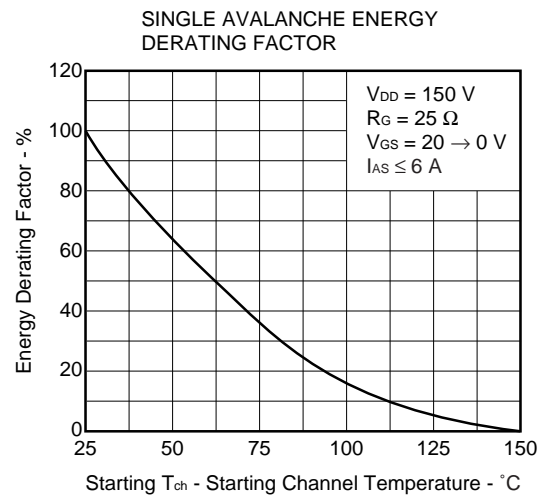
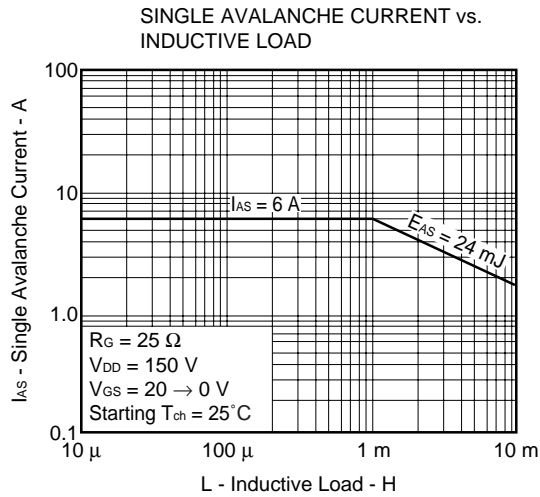
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



DRAIN TO SOURCE ON-STATE
RESISTANCE vs. DRAIN CURRENT

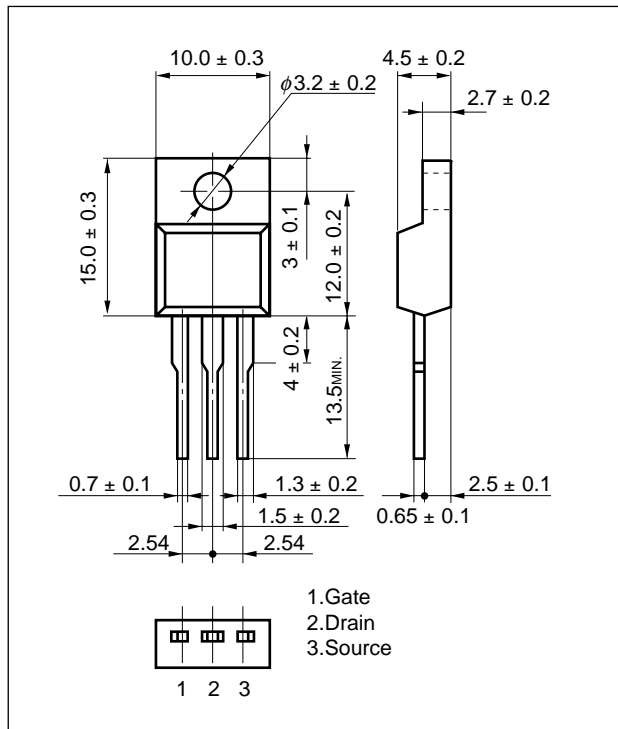




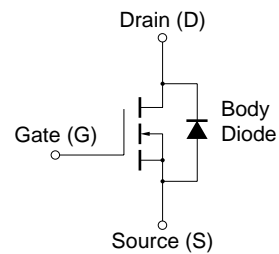


PACKAGE DRAWING (Unit: mm)

Isolated TO-220(MP-45F)



EQUIVALENT CIRCUIT



Remark Strong electric field, when exposed to this device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop generation of static electricity as much as possible, and quickly dissipate it once, when it has occurred.

[MEMO]

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